NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594

April 7, 2017

MATERIALS LABORATORY FACTUAL REPORT Report No. 17-037

A. ACCIDENT INFORMATION

Place : Chalmers, Indiana
Date : March 14, 2017
Vehicle : MD Helicopter 369FF, N530KD
NTSB No. : CEN17FA127
Investigator : Joshua Lindberg

B. COMPONENTS EXAMINED

Portions of a fractured needle assembly for pulling a sock line (metal cable) through an electrical transmission tower.

C. DETAILS OF THE EXAMINATION

Photographs of the as-received portions of the fractured needle assembly is shown in figures 1 and 2. The needle assembly contained a closed loop hook at the center and leading end. To move the needle assembly from one tower to the other, or to either side of a tower, during an aerial threading operation, a helicopter would have attached a device such as a grappling hook to either one of the closed loop hooks. The top portion of each closed loop hook also contained an open hook portion that faced aft. When passing a needle assembly through a tower structure, the open hook portion would temporarily be attached to the underside of the cross-member portion of the tower. The closed and open loop portions were made from solid round bar stock steel, and they were attached by a weld to each other and the body (frame) of the needle assembly. The frame was made from steel tube.

Visual examination of the needle assembly revealed the closed loop hook fractured at two locations. The fractures were through the round solid bar portion and intersected a portion of the weld at the frame portion. The fracture faces were cleaned with Alconox, a commercial detergent. Bench binocular microscope examination of the fracture faces revealed rough texture features on slant planes consistent with ductile-bending overstress separation, with no evidence of a preexisting crack, such as fatigue crack. The welds at the fracture face showed no evidence of defects such as porosity.

A metallurgical section was made through the loop portions in the areas indicated by arrows “1” and “2” in figure 1, in order to obtain an approximately 0.3 inch thick disc portion from the solid round bar. The diameter of the entire solid round bar stock steel measured approximately 1 inch. Rockwell hardness testing of the flat cut faces (which were perpendicular to the length of the solid round bar) each produced average hardness values

of 93 HRB, which converted to a tensile strength of approximately 94,000 pounds per square inch.[1]

The closed loop hook (solid round bar) portion at the leading end of the needle assembly contained no evidence of a crack or fracture.

Frank Zakar
Senior Metallurgist

[1] Conversion was per ASTM A370.

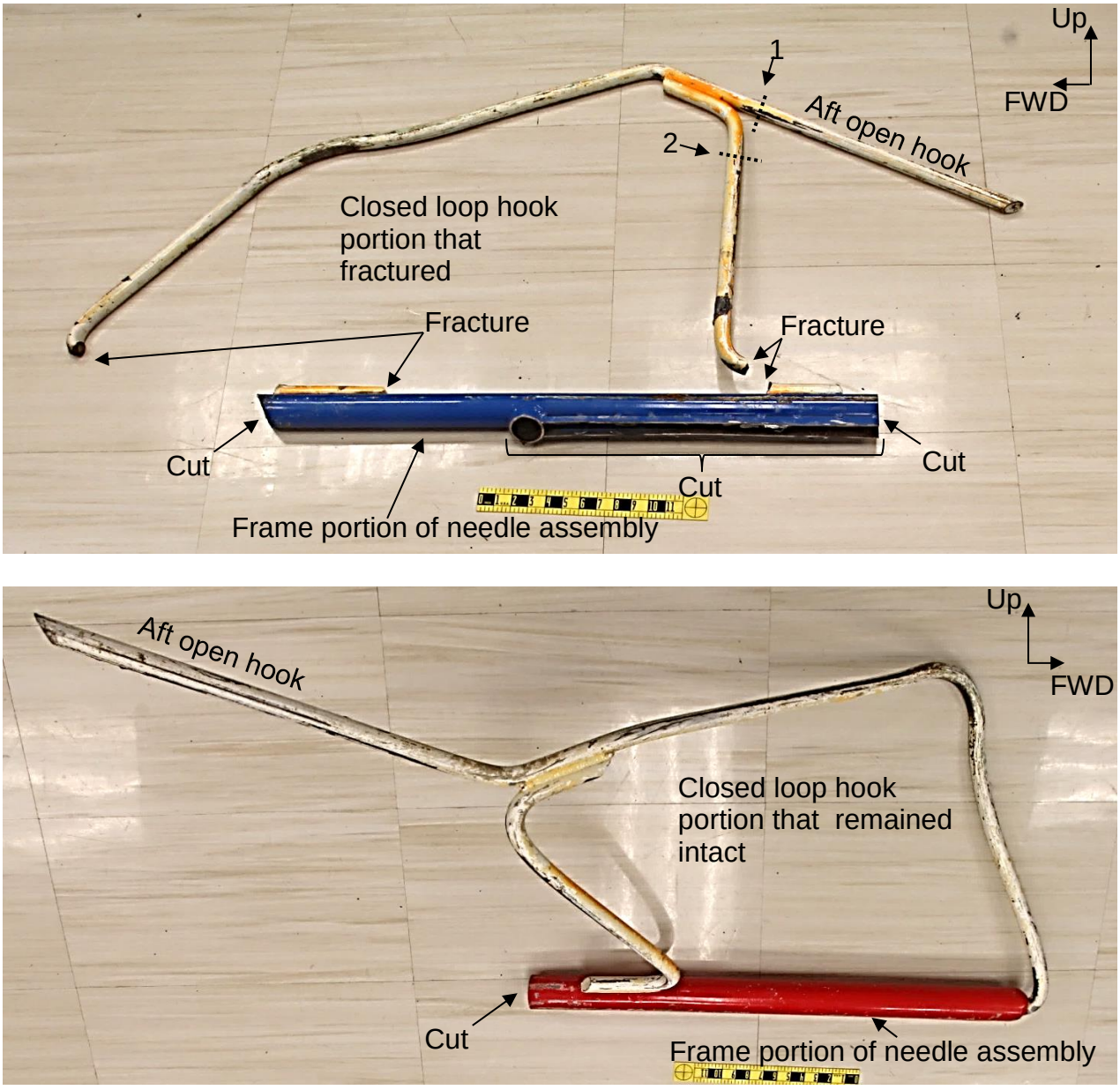

Figure 1. As-received portions of the fractured needle assembly showing the hooks at the center portion of the needle assembly (upper side of the page) and leading end portion of the needle assembly (lower side of page).

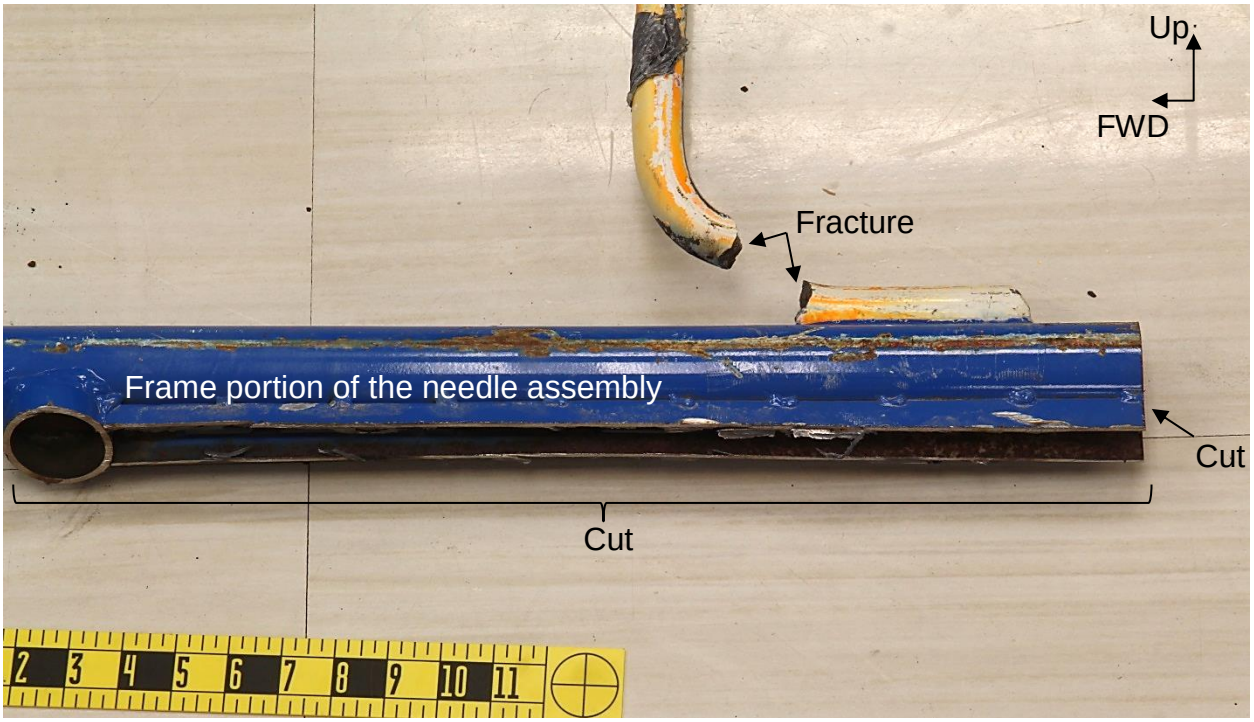

Figure 2. Close-up photograph showing one end of the fractured hook at the center portion of the needle assembly.